

Development of a climatology of vertically complete wind profiles from Doppler Radar Wind Profiler systems

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Assessment of space vehicle loads and trajectories during design requires a large sample of wind profiles at the altitudes where winds affect the vehicle. Traditionally, this altitude region extends from near 8-14 km to address maximum dynamic pressure upon ascent into space, but some applications require knowledge of measured wind profiles at lower altitudes. Such applications include crew capsule pad abort and plume damage analyses. Two Doppler Radar Wind Profiler (DRWP) systems exist at the United States Air Force (USAF) Eastern Range and at the National Aeronautics and Space Administration's Kennedy Space Center. The 50-MHz DRWP provides wind profiles every 3-5 minutes from roughly 2.5-18.5 km, and five 915-MHz DRWPs provide wind profiles every 15 minutes from approximately 0.2-3.0 km. Archived wind profiles from all systems underwent rigorous quality control (QC) processes, and concurrent measurements from the QC'ed 50- and 915-MHz DRWP archives were spliced into individual profiles that extend from about 0.2-18.5 km. The archive contains combined profiles from April 2000 to December 2009, and thousands of profiles during each month are available for use by the launch vehicle community. This paper presents the details of the QC and splice methodology, as well as some attributes of the archive.